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CLASSIFICATION C-O-N-F-I-D-E-N-T-I-A-L [redacted]

CENTRAL INTELLIGENCE AGENCY

INFORMATION REPORT

REPORT [redacted]

CD NO.

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COUNTRY USSR (Black Sea)

SUBJECT Isotope Separation at the Nuclear Research Institute at Agudzeri

PLACE ACQUIRED [redacted]

DATE OF INFO. [redacted]

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SUPPLEMENT TO REPORT NO.

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THIS IS UNEVALUATED INFORMATION

[redacted]

Attached is [redacted] forwarded as received.

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[redacted] Comments:

1. On page 1, Agudzheri should read Agudzeri; Ochimchiri should read Ochemchiri.

2. On page 2, Danielievski may be Professor Viktor Vasilyevich Danilevskiy.

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CLASSIFICATION C-O-N-F-I-D-E-N-T-I-A-L [redacted]

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COUNTRY USSR REPORT

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TOPIC 'Activities in the Field of Isotope Separation at the Nuclear Institute of Professor Hertz in Agudzheri

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EVALUATION PLACE OBTAINED

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DATE OF CONTENT

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DATE OBTAINED DATE PREPARED 4 November 1954

25X1

REFERENCES

PAGES 3 ENCLOSURES (NO. & TYPE)

This is UNEVALUATED Information

REMARKS

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Mass Spectrograph

1. Between 1946 and late 1948, Schuetze (fnu) worked on the construction of a mass spectrograph for which Busse (fnu) prepared the individual parts. It was believed that four units were built of which at least two were put into operation. According to the parts produced for the mass spectrographs, there were probably no essential differences in size and design. In 1948, the Soviets became impatient because none of the units were completed and serviceable and threatened to punish Schuetze. A short time later, however, the first analyses were made and Schuetze was given an award instead of punishment.

2. The magnetic field system of the mass spectrograph was composed of a copper tube, about 60 cm long, about 30 mm in diameter and about 2 mm thick, which was externally and internally nickel plated and fitted with screwable flanges at both ends. The entire tube was shielded with an asbestos wrapping. About 40 cm of the middle part of the tube were flattened so the walls were only 5 to 10 mm apart. This part of the tube was curved about 60 degrees. The free ends of the tube extending from the pole shoes parted and were fitted with a filament winding of chrome nickel tape, 0.3 x 3 mm, on top of a thin asbestos layer. This filament winding was to be controlled so as to effect a permanent temperature of 300 centigrades maximum of the tube walls. The soft-iron cores were trapezoidal in section, about 10 x 10 cm and followed in shape the angular position of the tube at this part. No information was obtained on the connection of the cores to the rear. The pole shoes, about 3 x 40 cm, were screw fastened. The spool heads were made of brass sheets, 5 mm thick. Each coil had about 24,000 windings of enamel copper wire, 1 mm in diameter.[1]

3. In 1947, Dr Busse (fnu) ordered an ion source. The unit was made of a thin nickel sheet casing shaped and was the size of a match box. One of the walls was provided with a slot type window, about 5 x 30 mm. A wire, probably of tungsten, led through the interior of the casing which could be screwed on a tube flange, thinner and smaller than the tubes described in paragraph 2.

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Busse stated that these ion sources were required for a test model of a small spectrograph which in turn was built in connection with instruments which Busse constructed for Schuetze. No information was obtained on the ion sources of the spectrographs built by Schuetze.

4. The other working set of the mass spectrograph was installed in a cabinet, about 50 x 60 x 130 cm, which was composed of a steel frame with five steel sheet drawers, each about 25 cm high. The front walls of these drawers were fitted with various measuring and control instruments, while the rear walls contained plugs, etc. The electric parts were installed inside the drawers. A cathode-ray tube with externally visible measuring grid screen was installed in the second drawer from the top. Electric parts produced for the operating power system primarily included transformers for the heating system and tension of the cathode-ray tube, with a filament voltage of 6.3 V, tension of the cathode of 5 to 6 kV and core output (Kernleistung) of 150 W, and furthermore additional transformers for 5 to 6 kV, rectifier parts and parts for the mains stabilization. Numerous five-pin plugs to switch several pentode systems were constructed for the rear wall of the drawers. The cathode-ray tube had a diameter of about 25 cm at the screen and was about 40 cm long. It was not learned how the magnetic field unit was installed or fitted into the cabinet and no information was obtained on the operating condition.

Tube Diaphragm

5. In about mid-1948, Reichmann (fnu) completed his development of nickel oxide tubes. No new information was obtained on size and production method of these diaphragm. A device was constructed for the precise measuring and cutting of the tube ends after the sintering process. The tubes were pushed on a slightly conical metal rod which in turn were fastened in a lathe chuck so the extending end could be cut off with a disc knife. Laboratory worker Danielevski (fnu) experimented on conical nickel sheet mouthpieces 0.2 mm thick and their production. These mouthpieces were to be welded to the ends of the tube and thus effect a snug elastic fit of the tubes between the flow nozzles within the circulation system. The middle part of the conical mouthpiece was elastic, while the rigid end was precisely fitted into the end of the tubular diaphragm. Two methods were applied to produce the welding heat in a vacuum tube. Leverenz constructed a device to accumulate welding heat by means of a filament winding around the welding seam. Since this method apparently failed to bring any satisfactory results, Weck (fnu), an electrical mechanic, was ordered to find another method, which was eventually applied. This sytem involved a series of about 10 oil condensers, each about 20 x 50 x 50 cm, to produce a high tension which was discharged in a short heavy impulse to the connection between diaphragm and mouthpiece. It was believed that at least some tubular diaphragm of the series of 800 produced were provided with these mouthpieces. Danielievski and Weck continued to work on this project.

Diffusion Boxes

6. In early 1948, Professor Hertz ordered a heating system for a pair of diffusion boxes at his laboratory. These boxes were made of copper and measured about 10 x 20 x 50 cm, much smaller than the boxes developed at about the same time by Muehlenpfordt. Three copper connecting pipes, about 25 mm in diameter, extended from two of the walls, while the other walls were plain. The 220 V a.c. heating system was to effect a continuous heat of 300 centigrades maximum. The tube connections and two or three bore holes on each wall for thermo elements had to be insulated against the heat produced by mica plates with standard filament winding. Insulation was effected by asbestos shields. In this arrangement, the heating system covered about 80 percent of a wall. Four side-walls of a total of two boxes were heated. Laboratory worker Walz (fnu)

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designed a similar heating system for the Muehlenpfordt diffusion boxes in which the heating elements were fitted into the space left by the T-profiles reinforcing the side walls. Hoeferle (fnu) installed the barriers into the interior of these boxes.

Separating Sequence.

7. Muehlenpfordt stated in 1948 that an enrichment of 2 percent had been achieved. In 1949 an enrichment of four percent had been achieved by the same system.

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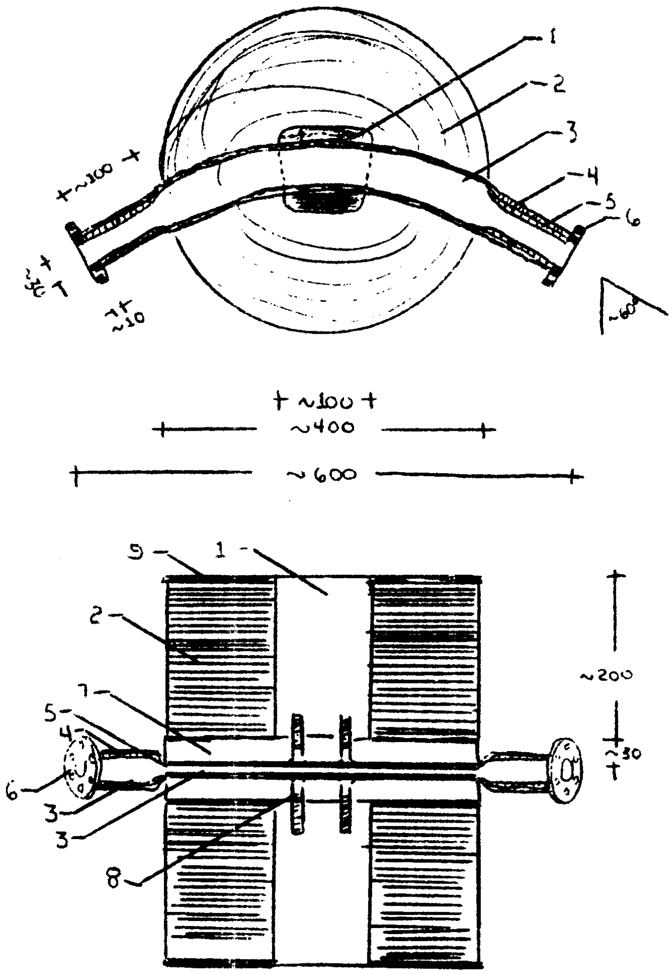
Sketch No. 1
Magnetic Field Unit of a Mass Spectrograph



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Sketch No. 1
Magnetic Field Unit of a mass Spectrograph, Scale 1 to 5

Legend:

1. Magnet cores, about 100 x 100 mm in section.

2. Enamel copper wire, 1 mm in diameter, 24,000 windings each.

3. Copper tube, internally and externally nickel plated, about [illegible]0 mm in diameter, and about 2 mm thick, flattened part between the pole shoes.

4. Filament winding of chrome nickel tape, 0.3 x 3 mm or asbestos layer. The filament winding was fed with power from an adjusting transformer for permanent heat of 300 centigrades in the tube.

5. Thick asbestos wrapping.

6. Tube flanges.

7. Pole shoes.

8. Fastening screws of pole shoes.

9. Brass spool support, about 5 mm thick.

The vacuum pressure of the tube was planned to be 10^{-6} Torr.

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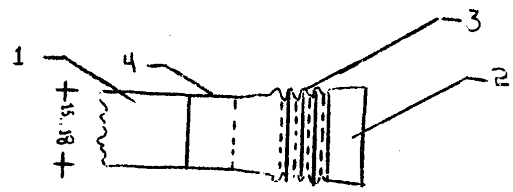
Sketch No. 2
Mouthpiece of a Diaphragm Tube:



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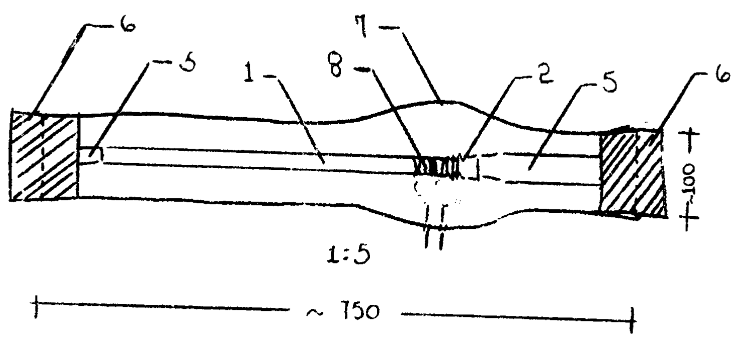

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Sketch No. 2
Mouthpiece of Diaphragm Tube

Legend

1. Nickel oxide tubes, about 400 mm long, 15 to 18 mm in diameter, and about 0.2 to 0.3 mm thick.

2. Snug fitting of nickel sheet mouthpiece, about 0.2 mm thick.

3. Elastic part of mouthpiece.

4. Fitting part to tube, welding area.

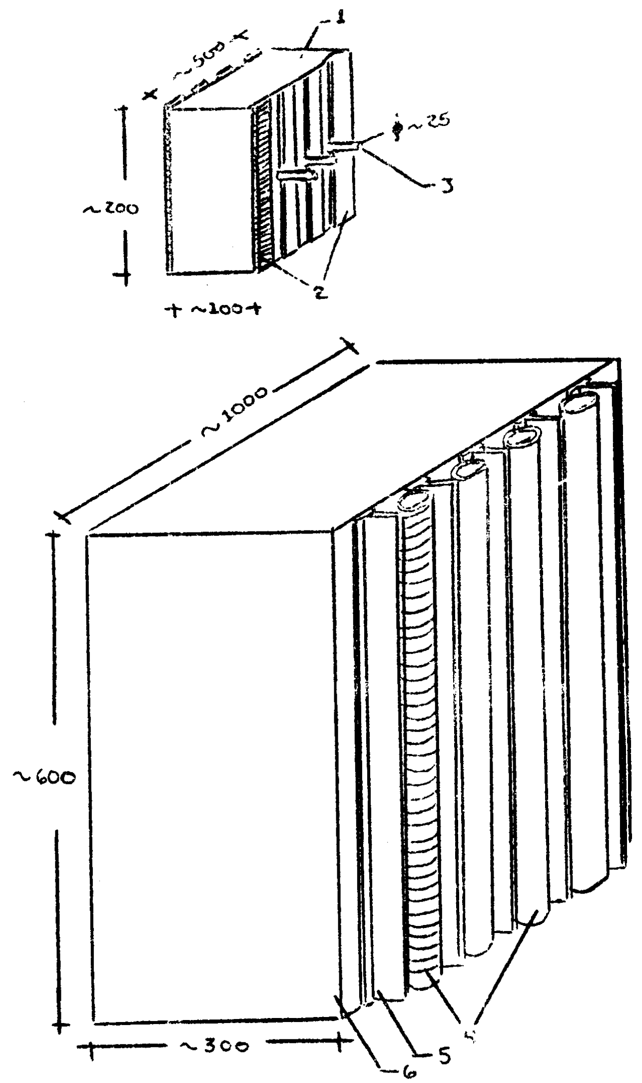
5. Conical support.

6. Final cork, also functioning as diffusion barrier, and fastening of supports.

7. Bulged glass tube, vacuum pressure of 10^{-6} Torr.

8. Welding seam (with filament wire).

Sketch No. 3
Diffusion Boxes with Heating Systems:



Sketch No. 3
Diffusion Boxes with Heating Systems

Legend:

1. Copper diffusion box developed by Professor Gustav Hertz.

2. Heating plates, mica with filament.

3. Copper connection tubes, about 25 mm in diameter.

4. Ceramic tube with filament winding.

5. T-profiles reinforcements of box walls.

6. Steel diffusion box developed by Justus Muehlenpfordt.

Sketch No. 4
Amplifier-Control and Measuring Cabinet, Scale 1 to 10 for Mass Spectrograph